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(54) Title: MULTIMEDIA TELECOMMUNICATION AUTOMATIC CALL DISTRIBUTION SYSTEM
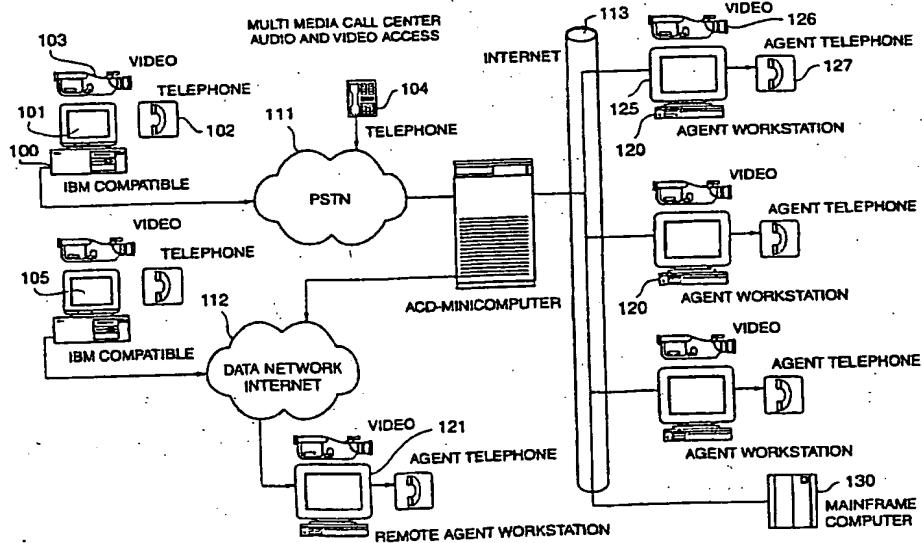
(57) Abstract: A multimedia telecommunication automatic call distribution center server (110) which allows access to the call center via a plurality of access means, including telephone (111) and data (112) networks to provide simultaneous voice (104), data (101), and video (103) access, and ensures effective transparent spreading of agents (120 and 121) over different geographical locations. The automatic call distribution center of the present invention uses a multimedia automatic call distribution server (110) acting as connection manager for the data network (112) callers and provides for automatic caller identification (130).

MULTIMEDIA TELECOMMUNICATION AUTOMATIC CALL DISTRIBUTION SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention

5   This invention relates to the field of multimedia
telephony switching and routing. More specifically, the
invention relates to telephone automatic call distribution
("ACD") for call centers, and in particular to
10   geographically distributed multimedia automatic call
distribution systems ("MMACD") connected to a plurality of
voice and data networks.

Background of Related Art

15   A call center is a business unit that uses groups
of agents or telephone representatives to conduct specific
transactions with calling customers. The opportunity to
establish a call center exists anywhere where more than one
person answers the same or similar types of calls.
20

In this competitive world companies need an
advantage. Whether a business is large or small, call
center automation provides an advantage anywhere where a
business relies heavily on telephone transactions. Call
25   centers provide a business advantage by getting an edge on
competition through increased customer satisfaction,
increased productivity and revenues, and reduced operating
costs.

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The instant invention ensures that companies will
have a competitive advantage by solving the problem of
providing a multimedia telecommunication ACD system which:
allows access to the call center via a plurality of access

means, including simultaneous voice, data, and video telephony, ensures effective transparent spreading of agents over different geographical locations, acts as a connection manager for data network callers, and provides

5   for automatic caller identification.

        Business applications for call centers are virtually unlimited in the types of transactions that they can accommodate. Call centers can support, for example,

10   sales, including order entry, order inquiry, and reservations; financial services, including funds transfer, credit card verification, and stock transactions; information services, including event schedules, referral services, transportation schedules, and yellow pages;

15   customer services, including technical support, repair dispatch, and claims handling.

        Despite the almost innumerable applications, however, existing ACD centers have several limitations.

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        One notable drawback to ACDs is that they lack intelligence. In other words, limited inflexible intelligence is built into the ACD software. Routing of inbound and outbound calls is based on circuit switching.

25   Furthermore, existing ACD centers cannot be accessed through a plurality of access means, such as voice, data, and video. To maximize existing resources and to take advantage of the latest technology, ACD manufacturers are trying to open their systems to third-party inbound and

30   outbound call management systems by integrating, via the recently introduced Computer Telephony Integration ("CTI") standards, the Telephony Application Programming Interface ("TAPI"), the Telephony Services Application Programming

Interface ("TSAPI"), and other proprietary protocols. These third-party inbound and outbound call management systems apply computer control and functionality to telephones. Adding computer intelligence to unintellegent telephone devices provides users with more information about inbound calls and lets them use telephones more effectively to distribute information by providing not only customer records coincident with inbound and outbound phone calls, but also skill-based call routing matching agent skills with caller needs and virtual, or geographically distributed, call centers.

Yet another drawback of the present technology, which integrates traditional telephone switching technology utilizing circuit switching with information systems, i.e. computers, is that it does not provide a cost-effective solution for the integration of telephone calls with computers. Additionally, the present systems do not effectively address the need for ACDs to be able to transparently spread agents over different locations. Moreover, present state of the art systems do not address at all the emerging multimedia communication standards such as simultaneous voice, data, and video telephony access to the center.

One recent trend in the ACD industry is to enable call agents to be more efficient, productive and to ultimately provide the best service to the customer during the first contact. Technologies such as Automatic Number Identification ("ANI") where the caller phone number is passed to the agent, give agents the opportunity to access information about the caller from corporate databases. The latest CTI technologies play a major role in helping

companies respond to industry trends and experience increased productivity and customer service goals by integrating traditional ACDs with computers.

In parallel to the development of ACDs, there are Internet Customer Service Centers ("ICSCs") under development. These applications provide for access to a World Wide Web ("WWW") site, where information pertaining to customer service, such as order status or tips for problem resolution, can be easily obtained. The user of the ICSC uses a WWW browser to search for the requested information. The user may obtain information in the form of text, voice or video. Further, the user may download information to computer data files. Live transfer to a customer service representative is not possible. Examples of patents covering various aspects of communication via data and telecommunication networks are described below.

U.S. Patent No. 5,533,115 to Hollenbach et al. discloses an advanced ACD for providing information to callers through the Public Switch Telephone Network ("PSTN"). An incoming call from a customer passes through the PSTN to an intelligent peripheral, a service control point, and an ACD. In many cases, the caller is prompted in queue to provide some information, such as the caller's phone number or account number. This information is used to access data records stored in a database which are presented to an agent at an agent terminal. The agent station has access to external communication services, one of which is the Internet. Similarly, U.S. Patent No. 5,546,452 to Andrews et al. discloses an ACD controlled by a distributed central controller. However, neither Hollenbach et al. nor Andrews et al. appear to disclose an

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ACD with the capacity to service multimedia callers; only
the agent stations have access to the Internet or wide-area
networks. Unfortunately, therefore, neither Hollenbach et
al. nor Andrews et al. solve the problem of allowing access
to a multimedia ACD via data networks. Furthermore,
neither Hollenbach et al. nor Andrews et al. teach or
disclose the use of an MMACD Server as connection manager
for data network callers.

U.S. Patent No. 5,500,859 to Sharma et al.
discloses a personal communications system operating on a
personal computer which allows the user to select between
different communications functions, including telephone
call, voice mail, fax transmissions, and multimedia mail.
Sharma et al., however, does not solve the problems of
providing a multimedia telecommunication ACD system which
allows access to the call center via a plurality of access
means and providing an MMACD server to act as connection
manager for data network callers.

U.S. Patent No. 5,384,771 to Isidoro et al.
discloses a multimedia call configuration system. Isidoro
et al. uses an object oriented command set to establish a
multimedia call over a broadband network. One command set
relates to the call configuration and another -- to the
connection configuration. Unfortunately, however, Isidoro
et al. does not solve the problem of providing a multimedia
telecommunication ACD system which allows access to the
call center via a plurality of access means; rather, it is
directed toward establishing communications between
multiple parties using a variety of media within the same
communication.

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U.S. Patent No. 5,546,324 to <u>Palmer et al.</u> discloses a video conferencing system used over a data network to communicate among terminals of the network. However, <u>Palmer et al.</u> is only directed to transferring

5   video and audio data. Unfortunately, <u>Palmer et al.</u> does not solve the problems of providing a multimedia telecommunication ACD system which allows access to the call center via a plurality of access means and providing a MMACD server to act as connection manager for data network

10   callers.

U.S. Patent No. 5,526,353 to <u>Henley et al.</u> discloses a system and method for communication of audio data over a packet-based network. <u>Henley et al.</u>, however,

15   does not solve the problems of providing a multimedia telecommunication ACD system which allows access to the call center via a plurality of access means and providing a MMACD server to act as connection manager for data network callers.

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U.S. Patent No. 5,241,625 to <u>Epard et al.</u> discloses a system for sharing screens over a heterogeneous network. Similarly, U.S. Patent No. 5,473,680 to <u>Porter</u> discloses methods and apparatus for interfacing with application

25   programs to manage multimedia multiparty communications using different hardware systems and devices. Neither <u>Epard et al.</u> nor <u>Porter</u> solve the problem of providing a multimedia telecommunication ACD system which allows access to the call center via a plurality of access means or a

30   MMACD server acting as a connection manager for data network or modem callers.

In view if the foregoing, there is a need, therefore, for a multimedia telecommunication ACD system which: allows access to the call center via a plurality of access means, including simultaneous voice, data, and video telephony; provides an MMACD server acting as a connection manager for data network callers; enables call agents to answer calls without the use of a telephone set; and ensures effective transparent spreading of agents over different geographical locations.

SUMMARY OF THE INVENTION

The present invention alleviates to a great extent the foregoing shortcomings by providing a multimedia telecommunication ACD system which allows access to the call center via a plurality of access means, including simultaneous voice, data, and video telephony, and at the same time ensures effective transparent spreading of agents over different geographical locations. The ACD system of the present invention uses an MMACD server acting as connection manager for data network callers and provides for automatic caller identification. It is thus an object of the present invention to implement a call center exchange by utilizing packet switching technology so that the same packet data backbone is shared for transport and routing of the calls as well as data.

It is a further object of the invention to provide videotelephony between a caller and a call center agent. This function is particularly valuable in instances where body language and creation of rapport is important to providing good service. Videotelephony makes it possible to demonstrate particular products or maintenance

activities. Similarly, the call center agent can view the customer's activities and reactions.

It is a further object of the invention to provide screen and application sharing between the caller and the agent. Whenever a caller requires support with a software application, it is invaluable for the support agent to view the remote desktop. It is thus an object of the invention to provide this functionality as an integrated part of a multimedia call center.

It is a further object of the invention to provide the caller with an ability to reach multimedia information on-line and to transfer to a live agent or to leave an electronic or voice message.

It is a further object of the invention to provide intelligent routing and queuing of calls to agents. Thus, the multimedia server should have the capability of routing calls to particular queues based on the type of call, the area of interest selected by the caller, the caller's identification, and other relevant criteria.

It is a further object of the invention to provide intelligent routing and queuing of messages to agents for processing.

It is a further object of the invention to integrate an Internet Customer Service Center as described above with a call center so a caller/customer arriving at an Internet site can transfer to a live or automated agent.

It is a further object of the invention to provide automatic caller identification for purposes of more efficient service, proper call routing, access verification, and billing. The conventional methods use ANI information obtained from the telephone company for these purposes or the caller is required to identify himself by entering his identification number by pressing the appropriate buttons on his telephone. While the present invention uses the above methods, it also identifies network callers by their network addresses (carried by the network protocol), and/or account identification numbers and passwords, and/or by encrypted electronic signatures.

It is yet another object of the invention to provide an ACD center where the agents may respond to multimedia calls by using a computer only.

Other objects and advantages of the present invention will be readily apparent from the following description and drawings which illustrate the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating the major subsystems of the present invention and their connection to a network.

FIG. 2 is a block diagram illustrating the major components of the MMACD server 110 of FIG. 1.

FIG. 3 is a block diagram illustrating the major components of a typical agent workstation.

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FIG. 4 is a block diagram illustrating the major
components of a typical remote agent workstation 125 shown
in FIG. 1.

FIG. 5 is a block diagram illustrating the
interconnection of a distributed call center.

FIG. 6 is a flowchart illustrating method of access
to a call center from the Internet; and

FIG. 7 is a flowchart illustrating a method of
accessing a call center by means of a modem.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Now referring to the drawings wherein like
reference numerals refer to like elements, FIG. 1
illustrates the interconnection of the multimedia ACD main
subsystems and their connection to the network. The
present invention provides access to a call center via a
plurality of access means. The access occurs through the
PSTN or Private Branch Exchange ("PBX") and via plurality
of data networks. PSTN access is possible through Plain
Old Telephone ("POTS") lines, Digital Trunks and Integrated
Services Digital Network ("ISDN") Basic Rate Interface
("BRI") or Primary Rate Interface ("PRI"). Data network
access is available through a variety of channels. For
example, Internet access is available utilizing a plurality
of possible Department of Defense ("DOD") protocols such as
User Datagram Protocol ("UDP"); the emerging Real Time
Protocol ("RTP") and Resource Reservation Protocol
("RSVP"), or via frame relay or Asynchronous Transfer Mode
("ATM") protocol and networks. As shown in FIG. 1, cloud

111 represents the PSTN or PBX network, while cloud 112
represents the above mentioned data networks.

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A plurality of callers represented by elements 100,
104, and 105 can access the MMACD server 110. A caller's
identification is verified by the MMACD server 110 and the
caller is then optionally presented with a menu of choices
following which he is routed to a plurality of agents
represented by elements 120 and 121. If no agent is

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available, the MMACD server places the caller on hold.
While on hold, the caller continues to browse through
information and receives information about how many callers
are waiting in line in front of him and the average waiting
time.

15
Routing algorithms, such as which caller will be
routed to which agent or agent group, based on caller
identity, and/or agent skills and/or call priority, are
stored in and decided by the MMACD server 110.

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Alternatively, the MMACD server may query external
databases for routing information. The MMACD server 110
provides appropriate administration tools to program such
routing algorithms.

25
In case of PSTN audio only access by caller 104,
the audio signal is converted by MMACD server 110 to
digital information which is compressed and then packetized
using protocols such as DOD Internet Protocol ("IP")
specifications. For audio only access, the caller is

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presented by audio menus which he navigates by means of
pressing buttons on his telephone set sending dual tone
multi-frequency ("DTMF") tones. Navigation by means of
voice recognition is also possible.

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        In case of data access via data network 112, ISDN,
or a modem over PSTN 111, callers 101 and 105 can access
the MMACD server 110 by means of a WWW browser such as
Microsoft Internet Explorer or Netscape Communications
5   Navigator™. MMACD server 110 comprises a WWW server such
as the Microsoft IIS server. Upon connecting to MMACD 110,
callers are presented with a WWW home page. Menus are
implemented by the WWW pages. When an agent becomes
available, the caller is directly connected to the agent
10   utilizing standard data communication protocols, such as
DOD IP. The MMACD server then acts as a connection manager
by supplying to the caller's connection software the IP
address of the available agent. The caller connection
software is implemented as a plug-in module into the
15   above-mentioned Microsoft browser or the Netscape
Navigator, or may be downloaded as an application.

        In the event the caller connection software is
downloaded as an application, it is invoked from the
20   browser as a result of a caller's wishing to connect to the
MMACD of a call center. A network connection is
established with the MMACD upon initiation of the caller
connection software. The MMACD interacts with the caller
connection software to provide the caller with status
25   information (which may consist of text, graphics, audio,
and video) on the call center, including information on the
caller's predicted hold time. Additionally, this
information may include advertisements and common problem
solutions.
30

        Once the MMACD has established a connection between
a caller and an agent, the caller connection software is
used to channel commands to the caller's telephony

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application. Commands such as call set up and termination,
initiate and terminate chat, initiate and terminate white
board, and initiate and terminate file transfer, are
facilitated through the use of this connection software.
5   The caller connection software also provides for remote
control of the caller's browser. This facilitates the
ability to perform collaborative browsing applications,
allowing a two-way link between an agent and a caller to
enable "walking" through specific problems. If the
10   connection software is not available on the caller's
computer, it is automatically downloaded and installed by
the MMACD server 110.

15   Calls to local call agents 120 are routed over
local area network ("LAN") 113. Calls to remote call
agents 121 are routed via a data network 112, or a through
direct data connection via ISDN (not illustrated).

20   Caller 105, accessing the center via data
connection 112, may be connected to agents 120 and provided
with a voice connection. Further, caller 105 will have the
ability to share applications and screens with the agent
utilizing protocols such as T.120 and to view the agent and
his actions via agent camera 126.

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In addition, callers equipped with video cameras
103 will also gain video access to agents 120, and a full
video telephony session will be available together with all
the communication means described above.

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All agents 120 and 121 are equipped with work
station computers 125, telephone terminals 127 and cameras
126. Additionally, all agents 120 and 121 have access to a

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center database server 130. The database server 130 is accessed for purposes of running call center applications, storing and retrieving caller data, and providing information for the caller. MMACD server 110 also has access to the center database 130 for purposes of providing automated information via voice access, Interactive Voice Response ("IVR"), and/or data access via the WWW access.

The plurality of callers can be equipped by the following configurations:

Caller 104 is equipped with a telephone set only. This caller has audio only access to the center.

Caller 100 is equipped with a personal computer and an integrated telephone set. Caller 100 gains audio and data connection to the center via a modem or ISDN via PSTN utilizing protocols such as Point to Point Protocol ("PPP"). Optionally caller 100 may be equipped with video camera 103. In this case, caller 100 will also gain video access.

Caller 105 is similarly equipped, except he utilizes a different means of connection to data network 112, such as PPP over a modem connection or ISDN through direct hook-up to the network via a private line of a corporate backbone.

EXAMPLE OF OPERATION: ACCESS FROM COMPUTER EQUIPPED WITH MULTIMEDIA AND CAMERA

Callers 100 and 105 equipped with computer 101, an integrated telephone 103, and videocamera 103, access MMACD 110 either via a modem and PSTN 111 or via data network

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112. When a call is answered by MMACD 110, a graphical access screen is displayed on the caller's computer. If possible, the caller's identity is determined from a data protocol or from a packet originating address, or if available, from authentication information carried by a protocol. The caller may further be asked to type his name and password. The caller then is requested to select a service and/or area of interest. An agent and/or agents or groups of agents are selected based on the caller identification and service and/or area of interest. If an agent is available to answer the call, the caller's data is sent via LAN 113 or data network 112 to agent workstations 120 or 121. A virtual data link is established between the caller and the agent. This link carries packets of multimedia information comprising voice, text, images, and video between callers 100 or 105 and agents 120 or 121. The caller and the agent can talk to each other, share screens, applications, and view each other and objects to which cameras 103 and 126 are directed.

If an agent is not available, the call is placed in an appropriate wait queue, based on caller priority, type of service and/or area selected, or access priority. The caller is notified of the current average queue wait time, the number of callers ahead of him, and other relevant information. The caller is also presented with an option to browse multimedia information recorded on MMACD server 110 or other servers in the network. Once an agent 121 serving the appropriate queue becomes available, the caller is transferred via data network 112 to agent 121. If the caller selects not to wait for an agent or browse through the information, he may leave a multimedia (voice, text, or

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voice and image) message that will be later handled by an
available agent.

EXAMPLE OF OPERATION: ACCESS FROM COMPUTER NOT EQUIPPED
WITH CAMERA

Callers 100 and 105 equipped with a computer and
integrated telephone, but not equipped with camera will be
provided with all the functionality in the above example,
with the exception that they will be able only watch video
and image information.

EXAMPLE OF OPERATION: ACCESS FROM TELEPHONE SET

Caller 104 makes a telephone call via PSTN 111 to
the call center main telephone number. The call may arrive
either via an analog telephone line or digital trunk. The
call is answered by MMACD server 110. The caller hears
voice prompts generated by the MMACD server 110 software,
directing him to enter his identification, which is
verified against a stored table. The caller may enter his
identification using his telephone DTMF dial pad. The
caller is further asked to select from the menu an area of
interest. An agent or group of agents is selected based on
caller identification and area of interest. If an agent is
available to answer the call, the caller's data is sent via
LAN 113 or data network 112 to agent workstation 120 or
121. An audio path is then created between the caller and
the agent by converting PSTN audio representation to
compressed network packet format and transmitting the
packets via LAN 113 or data network 112. Similarly, audio
data packets arriving from agents 120 or 121 are converted
to either analog or digital Pulse Code Modulation ("PCM")
telephone formats. If an agent is not available, the call

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is placed in an appropriate wait queue based on caller
priority, type of service, area of interest, or access
priority. The caller is notified of the current average
queue wait time, the number of callers ahead of him, and

5   other relevant information. The caller is presented with
the option to browse audio information recorded on the
MMACD server 110. Once an agent 121 serving an appropriate
queue becomes available, the caller is transferred via data
network 112 to agent 121. If the caller selects not to

10   wait for an agent or browse through the information, he may
leave a voice message that will be later handled by an
available agent.

FIG. 2 illustrates the main building blocks of the

15   MMACD server illustrated as element 110 in FIG. 1. The
MMACD server is based on a standard IBM-compatible Pentium
or other comparable computer 201. Standard parts of
computer 201 are a central processing unit ("CPU"), 32
Mbytes random access memory ("RAM"), a video card, and 1.2

20   Gbytes of Hard Disk storage. The MMACD operates on a
Microsoft NT 3.51 Windows NT Advance Server operating
system.

The CPU communicates with a network adapter 202

25   such as an Intel EtherExpress 16TP via the bus 204.
Network adapter 202 connects to an Ethernet backbone 211
(depicted as element 113 in FIG. 1) which carries all
administration data as well as relevant multimedia
information. Ethernet backbone 211 connects to an outside

30   data network 220 such as the Internet, via router 210. An
example of the router is the Cisco 500 CS. The router 210
is required for isolation of the server's internal network
from outside influences.

Via bus 204, the CPU also communicates with an analog telephone board 203 such as the Dialogic D41ESC or digital telephone board such as the Dialogic D/240SC-T 1205 which interfaces to PSTN or PBX via analog trunks 230 or digital trunks 232, respectively.

Audio traffic arriving from PSTN is digitized by telephony board 203 and converted to a digital format such as Adaptive Differential Pulse Code Modulation ("ADPCM"). The digital signal is forwarded to CPU 201 for processing. CPU 201 packetizes the voice signals and places the voice packets on the Ethernet backbone 211 addressed to an appropriate agent. Audio signals generated by the agents are sent via Ethernet backbone 211 to CPU 201 and forwarded to telephony board 203 where it is converted to analog or PCM formats in compliance with PSTN protocols.

Modem multimedia data traffic arriving via PSTN and analog trunks 230 is routed to telephony board 203 for detection of the type of call. If recognized as a modem call, the CPU instructs an appropriate modem in modem bank 211 to accept the call utilizing PPP or Serial Line Internet Protocol ("SLIP"). Modem bank 211 contains a plurality of modems such as AT&T Dataport. In the event of a PSTN connection via digital trunk 231, a channel bank 212 such as Newbridge Mainstreet A4 channel bank, is required to convert from digital to analog format. All services available to callers calling via data network 220 are also available to callers calling via modem bank 211.

Multimedia data traffic may also arrive via PSTN over ISDN trunks. This traffic is routed to Digital

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Telephony Board 205 capable of T1 (Digital Transmission
Link with capacity of 1.544 Mbps) or ISDN PRI access.

5   FIG. 3 illustrates the main building blocks of an
Agent Work Station ("AWS") illustrated as element 120 in
FIG. 1. AWS is based on a standard IBM compatible Pentium
or other comparable computer 301. Standard parts of
computer 301 are the CPU, 16 Mbytes of RAM, a video card,
and 1 Gbyte of hard drive storage. The workstation
10   operates on Windows 95 or other comparable operating
systems.

       The CPU communicates via bus 310 with network
adapter 302 such as the Intel EtherExpress 16TP. Network
15   adapter 302 connects to Ethernet backbone 311, illustrated
as element 113 in FIG. 1, which carries all administration
data as well as relevant multimedia information.

       Voice traffic is sent to audio-board 303 (such as
20   the Acer S23) which connects to the telephone handset (or
headset and microphone) 308. The audio-board translates
the digitized audio to an analog signal utilizing industry
standard codecs such as Microsoft PCM, ADPCM or Group
Special Mobile ("GSM") compression algorithm by the
25   European Telecommunication Standards Institute, which are
then played via a speaker headset 308. Similarly, analog
audio generated by the microphone of headset 308 is
converted by the audio-board to a digital format utilizing,
for example, the above-mentioned codecs. The resulting
30   digital signal is packetized by computer 301 and forwarded
to network adapter 302 to be sent to a caller. As an
option, the outgoing signal can be modified by digital

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signal processing means utilizing voice morphing techniques
to modify an agent's voice.

5   Video traffic is routed to video capture board 305,
such as Creative Labs Video Blaster SE100, where the data
is decoded utilizing industry standard codecs such as
Crystal Net SFM Codec (32) or NSVideo™ V2.1 Gray 8-bit
included with a package such as Connectix VideoPhone for
display on monitor 306. Similarly, video arriving from
10   camera 309 is encoded, for example, by the above-mentioned
codecs. Video data can consist of information such as
caller and/or agent images or images of objects of interest
that the caller and/or agent put in front of a camera. As
an option, the outgoing video signal can be modified by
15   digital signal processing means utilizing image morphing
techniques to modify an agent's image.

        Standard video monitor 306, such as Samsung
SyncMaster 17GLS, is used to display information about
20   callers, wait queues, and database information related to
the respective service to be provided by the agent to the
caller. If the call is made from a computer, the agent can
view the caller's computer screen. In the event a call is
made from a terminal equipped with a camera, the agent can
25   view the caller's image. All the information above appears
in separate windows, which can be arranged by the agent
according to his preferences. Keyboard and mouse 307, such
as standard Microsoft keyboard and mouse, are used as input
devices.
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        FIG. 4 illustrates the main building blocks of a
Remote Agent Work Station ("RAWS"). This workstation is
essentially the same as a local AWS, except that the RAWS

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connects to a data network 411 rather than to the AWS
Ethernet backbone, which is illustrated as 311 in FIG. 3.

5   FIG. 5 illustrates a distributed multimedia call
center. A distributed call center consists of a plurality
of geographically distributed self-contained multimedia
call centers A and B illustrated as elements 501 and 502.
Call centers 501 and 502 connect to PSTN 511 via central
office ("CO") trunks 520 and 521, respectively. Call
10   centers 501 and 502 also connect to a data network 510,
such as Internet, via data connections 530 and 531,
respectively. Remote agents 503 are also connected to the
data network 510.

15   Calls arriving from telephone callers via PSTN 511
to call center 501, for example, are converted to
compressed digital representation and then handled locally
or transmitted via data network 510 to another call center,
for example call center 502, or to remote agent 503. Audio
20   signals generated by remote agent 503 or remote call center
502 are sent via data network 510 to the originating call
center 501 and are converted to a PSTN-compatible signal
back to the caller. The above-mentioned method is used in
the case a PSTN transfer is not economical. In the event
25   the two call centers are in the same calling area, call
transfer is conducted via PSTN 511 and audio signals
generated remote agent 503 or remote call center 502 are
transferred to the originating call center 501 via PSTN
511.

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          Multimedia calls arriving via data network 510 are
routed to one of the call centers, for example call center
501, and are either handled by that center or forwarded to

another call center, for example 502, or to a remote agent
503. Two types of transfer modes are possible. Method A,
involves packets being readdressed and dispatched to their
destination. Method B, if supported by the caller's
software, involves the caller being directly reconnected to
the new destination. Under method A, data packets arriving
from the caller are re-addressed, but packets generated by
any center or agent are sent directly to the caller. Under
method B, all packets are transmitted and received directly
by the parties.

Distributed call centers 501 and 502 and remote
agents 503 have the ability to share databases and other
call center administration data.

FIG. 6 illustrates a typical method of access to a
call center by means of the Internet. At step 601, a
caller connects to the Internet by means of WWW browser
software and accesses a call center web page. The caller
types in identification, service request information and
presses or clicks requesting connection to a call center
Agent as illustrated in step 605. If identification
verification is required as in 610, access authorization is
checked in 615. If the caller is not authorized to access
the call center, an appropriate message denying access is
displayed and the caller is disconnected, as illustrated in
step 620. If the caller is authorized in 615, the call is
handled at step 625. If verification is not required at
step 610, the call immediately proceeds to step 625. At
step 625, the call center queues database is updated with
the information transmitted from the WWW page in 605. At
step 630, the caller's identification and requested
services information is analyzed and the caller is placed

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in an appropriate wait queue. The caller's computer
communicates with the call center via connection software,
configured as a browser helper module. Step 635 checks
whether this connection software exists on the caller's
computer and whether it is updated. If not, step 645
involves downloading this software or an update, to the
caller's computer. If the software exists at step 635 or
after it is downloaded at step 645, step 640 checks for the
availability of an agent in the appropriate queue. If an
agent is not available at step 640, wait information, such
as the length of the queue and expected wait time, are
displayed on the caller's computer at step 650. At step
655, the caller is placed on hold while waiting for an
available agent. While holding, the caller can browse
through information and screens available to him at the
call center WWW site or the global Internet.

While holding at step 655, the caller can also chat
via text, voice, or voice and video with other callers on
hold. Step 640 involves periodic checking whether an agent
becomes available, and queue information is periodically
updated in 650. Once it is determined in 640 that an agent
is available, the caller is connected to that agent at 660.
The connection can be voice, voice and data, or voice,
video and data connection.

FIG. 7 illustrates access to a call center by means
of a modem. The caller in step 701 makes a connection
using a Winsock Transmission Control Protocol/Interent
Protocol ("TCP/IP") dialer or another dial up software to
call into the call center via a modem. In 705 the call
center provides access to its internal network as a private
Internet access provider. The caller does not need to have

an Internet account. In 710, an IP address is allocated to the caller and he is logged on the network. At step 715, the caller continues according to the method as described in FIG. 6.

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The above description and drawings are only illustrative of the preferred embodiments that achieve the objects, features, and advantages of the present invention and it is not intended that the present invention is

10 limited thereto. Any modifications of the present invention which come within the spirit and scope of the following claims are considered part of the present invention.

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1.   A method for distributing telephone calls comprising the steps of:

receiving a telephone call in at least one server connected to an Internet Protocol network;

determining a destination for said telephone call from said at least one server connected to said Internet Protocol network;

converting said telephone call into an Internet Protocol session; and

sending said telephone call to said destination over said Internet Protocol network.

2.   The method of claim 1, wherein said step of converting said telephone call to said Internet Protocol session comprises the steps of:

packetizing said telephone call into packets;

assigning an Internet Protocol address, as the destination of said packets, to said telephone call.

3.   The method of claim 1, wherein said step of converting said telephone call into said Internet Protocol session comprises the steps of:

compressing said telephone call;

packetizing said telephone call into packets; and

assigning an Internet Protocol address, as the destination of said packets, to said telephone call.

4.   The method of claim 1, wherein said step of converting said telephone call into said Internet Protocol session comprises the steps of:

digitizing said telephone call;

compressing said telephone call;

packetizing said telephone call into packets; and

assigning an Internet Protocol address, as the destination of said packets, to said telephone call.

5.   A method for processing electronic messages in a telecommunication call distribution center comprising the steps of:

receiving an electronic message in at least one server connected to an Internet Protocol network;

determining a destination for said electronic message from said at least one server connected to said Internet Protocol network; and

sending said electronic message to said destination, over said Internet Protocol network.

6.   A method for processing multimedia telecommunication calls comprising the steps of:

receiving a call in at least one server connected to an Internet Protocol network;

determining a destination for said call from said at least one server connected to said Internet Protocol network;

identifying the source and type of said call; and

sending said call to said destination over said Internet Protocol network.

7.   The method of claim 6, wherein said step of identifying the source and type of said call comprises the steps of:

identifying whether the source is a telephone network or an Internet Protocol call; and

identifying whether said call type is live or message.

8.   The method of claim 7 further comprising the step of converting said call into an Internet Protocol session.

9.   The method of claim 8, wherein said step of converting said call into said Internet Protocol session comprises the steps of:

packetizing said call into packets;

assigning an Internet Protocol address, as the destination of said packets, to said call.

10.   The method of claim 8, wherein said step of converting said call into said Internet Protocol session comprises the steps of:

compressing said call;

packetizing said call into packets; and

assigning an Internet Protocol address, as the destination of said packets, to said

call.

11. The method of claim 8, wherein said step of converting said call into said

Internet Protocol session comprises the steps of:

digitizing said call;

compressing said call;

packetizing said call into packets; and

assigning an Internet Protocol address, as the destination of said packets, to said

call.

12. The method of claim 6 further comprising the step of:

placing said call in a wait queue for subsequent distribution to an available

destination.

13. The method of claim 12 further comprising the step of:

assigning a priority value for use by said wait queue.

14. The method of claim 12 further comprising the step of:

providing a caller of said call in said wait queue with access to multimedia

content.

15. The method of claim 14, wherein said access to multimedia content is provided over a web server connected to said Internet Protocol network.

16. The method of claim 6 further comprising the step of:

providing said caller of said call with multimedia content that comprises wait time information.

17. A multimedia telecommunication call distribution center for providing access to calls collectively having multimedia content, the center comprising:

a plurality of networks for carrying calls to said multimedia telecommunication call distribution center, said plurality of networks including at least one data network and at least one telephone network;

a plurality of calls accessing said multimedia telecommunication call distribution center via said plurality of networks;

a multimedia automatic call distribution server that is capable of distributing said multimedia calls to a plurality of multimedia call operators further comprising:

first connecting means for connecting said server to said data networks;

second connecting means for connecting said server to said

telephone networks;

converting means for converting calls from said telephone

network to data calls; and

queuing means for queuing said multimedia calls;

and, a plurality of multimedia call operator computing means connected

to said plurality of networks for processing said plurality of calls.

18.   A method of access to a multimedia call distribution center, the

method comprising the steps of:

connecting a caller to the call distribution center;

verifying caller information;

updating a queues database;

selecting a queue based on said caller information;

checking the caller connection software;

forwarding a caller in a queue to an available call operator.

19.   A method of access to a multimedia call distribution center according to claim 18 said checking step further comprising the steps of downloading and updating the caller connection software.

20.   A method of access to a multimedia call distribution center according to claim 18, wherein said data network comprises the Internet.
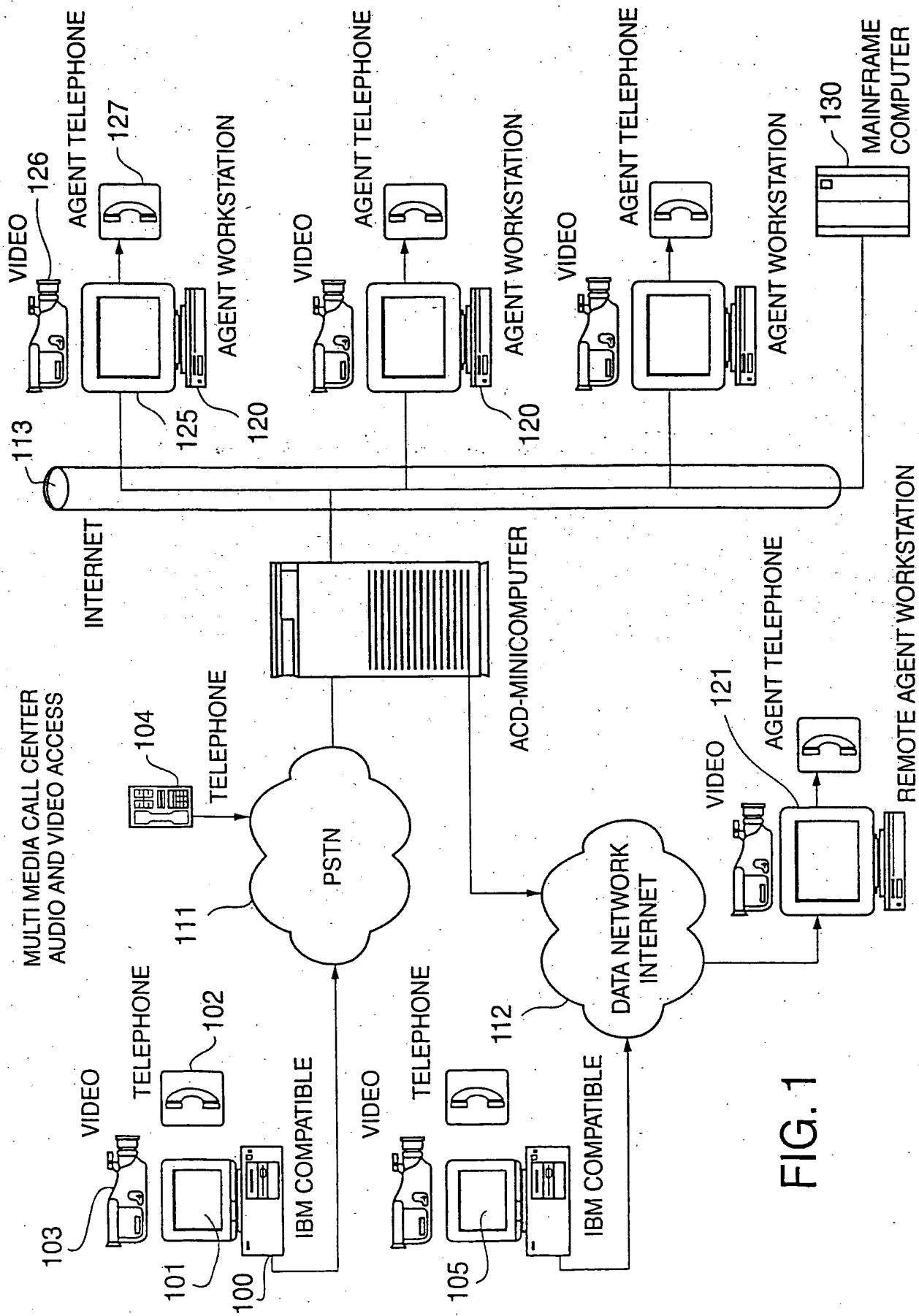
FIG. 1

FIG. 2

110, MULTIMEDIA ACD SERVER

INTERNET

211

202 — NETWORK ADAPTER

210 — ROUTER

220 — DATA NETWORK INTERNET

201 — CPU / RAM / VIDEO / HARD DISK / STORAGE

204

206 — SERIAL PORTS

211 — MODEMS BANK

212 — CHANNEL BANK

231 DIGITAL TRUNK

203 — ANALOGUE TELEPHONY BOARD

205 — DIGITAL TELEPHONY BOARD

230 ANALOGUE TRUNKS

221 — PSTN/PBX

232 DIGITAL TRUNK

FIG. 3

125, AGENT WORKSTATION

302 — NETWORK ADAPTER

301 — CPU RAM VIDEO HARD DISK STORAGE

303 — AUDIO BOARD

305 — VIDEO CAPTURE BOARD

304 — VIDEO BOARD

306 — MONITOR

307 — KEYBOARD AND MOUSE

310

308

309 — CAMERA

311 — INTERNET

FIG. 4

REMOTE AGENT WORKSTATION

FIG. 5

DISTRIBUTED CALL CENTER
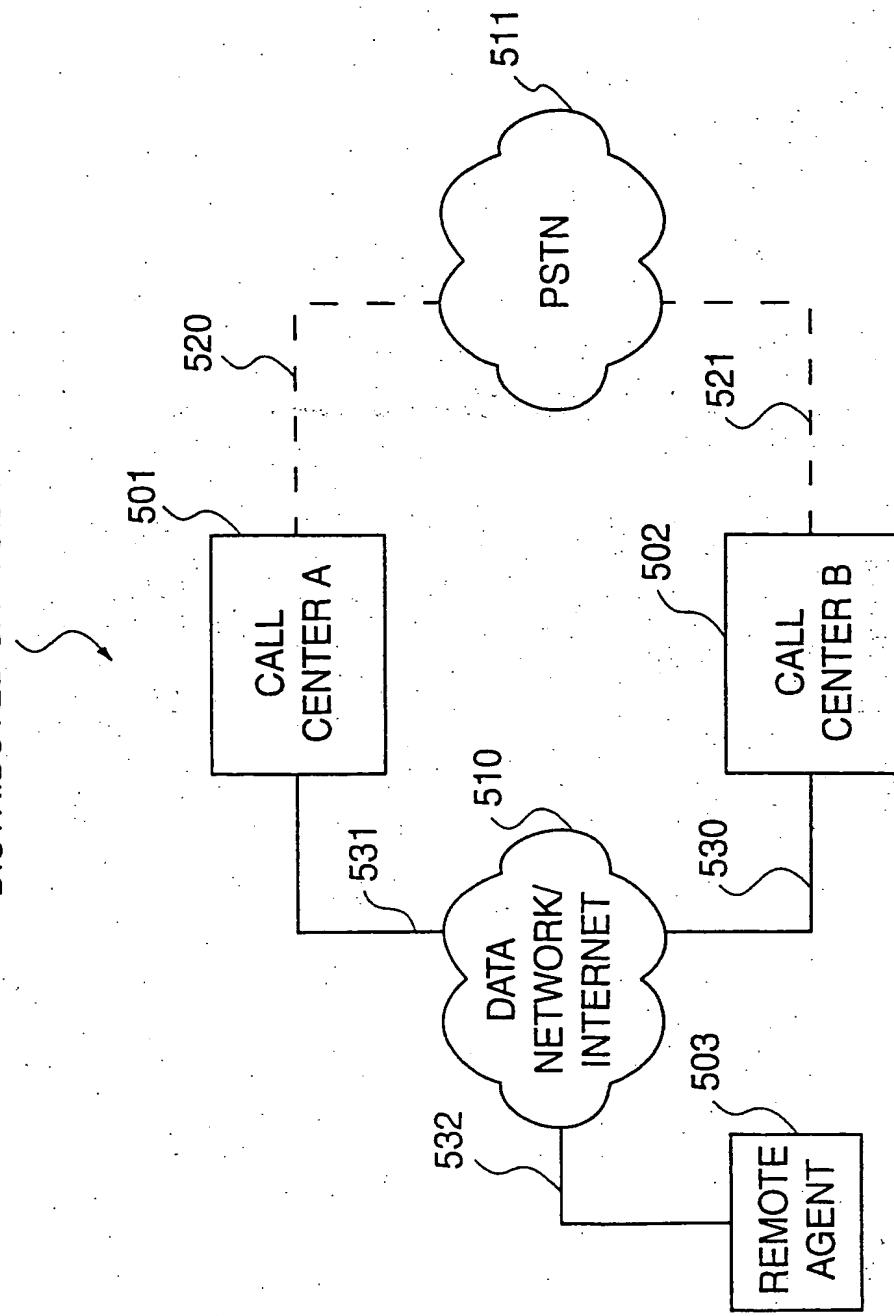
FIG. 6

ACCESS FROM INTERNET METHOD
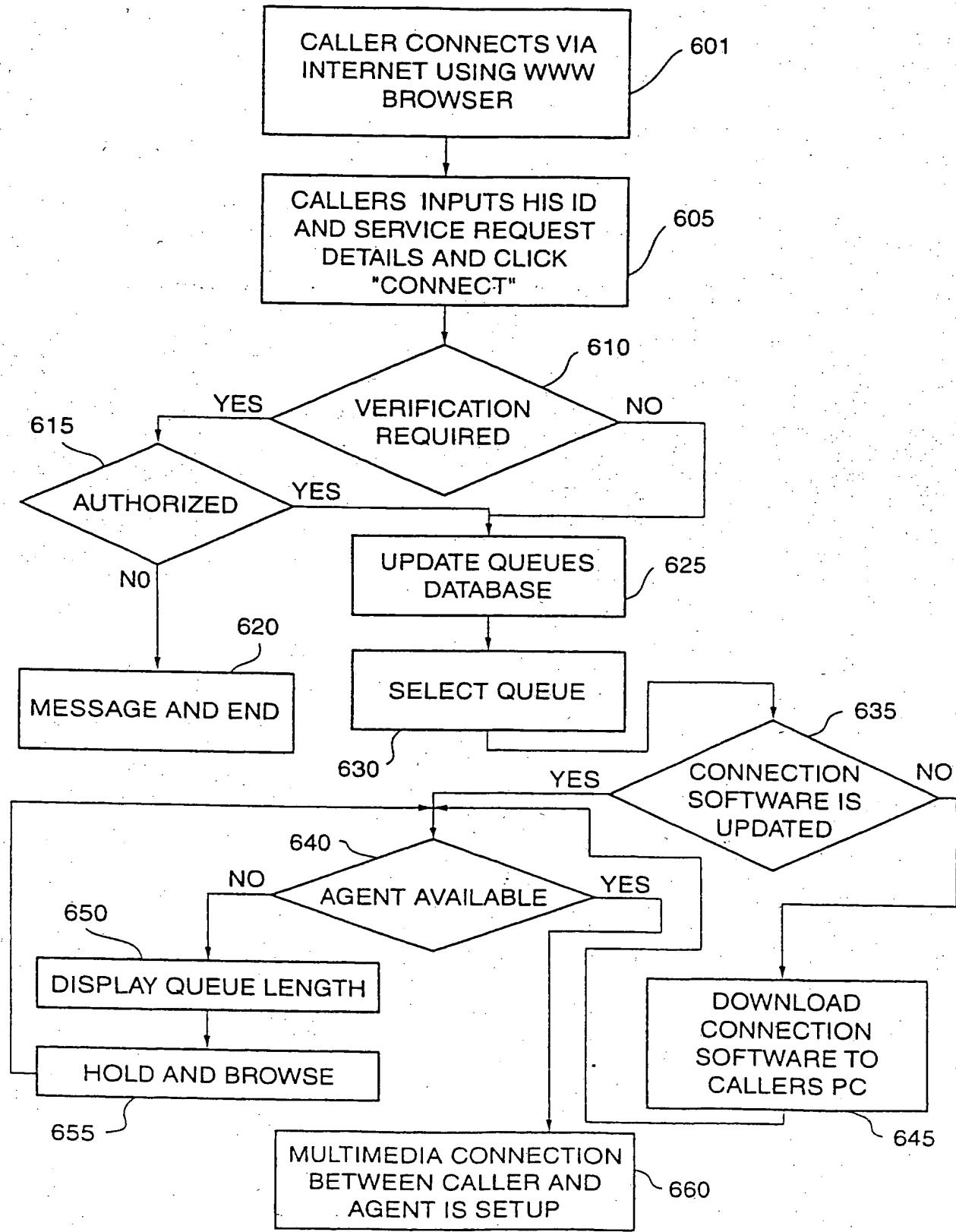
FIG. 7

ACCESS FROM MODEM METHOD
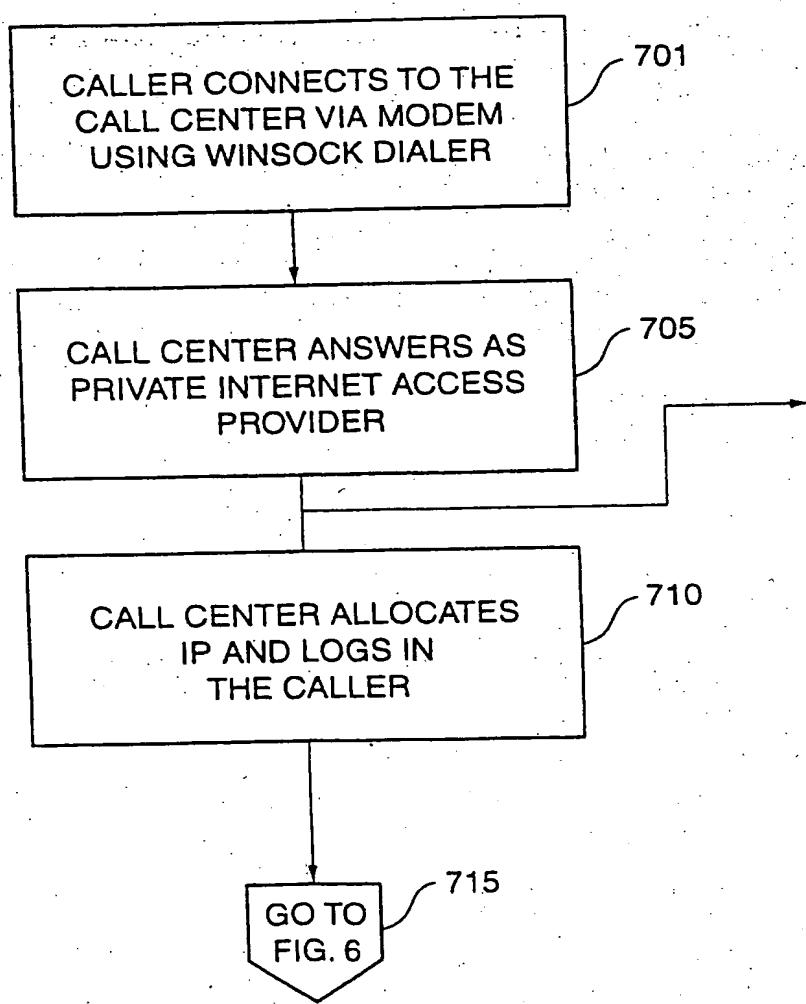
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┌─────────────────────────────┐
│   CALLER CONNECTS TO THE     │ ⟋ 701
│   CALL CENTER VIA MODEM      │
│   USING WINSOCK DIALER       │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   CALL CENTER ANSWERS AS     │ ⟋ 705
│   PRIVATE INTERNET ACCESS    │
│        PROVIDER              │
└─────────────────────────────┘
              │
              ▼
┌─────────────────────────────┐
│   CALL CENTER ALLOCATES      │ ⟋ 710
│      IP AND LOGS IN          │
│        THE CALLER            │
└─────────────────────────────┘
              │
              ▼
          ┌────────┐
          │ GO TO  │ ⟋ 715
          │ FIG. 6 │
          └────────┘
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INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H04L 12/66; H04M 3/00
US CL : 370/352, 401; 379/309

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 370/352, 353, 354, 355, 356, 400, 401; 379/203, 265, 309

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X, P	US 6,069,890 A (WHITE et al.) 30 May 2000, Figure 4, column 7 lines 44-67, columns 8 and 9, and column 10 lines 1-22.	1-16
X	US 5,991,292 A (FOCSANEANU et al.) 23 November 1999, Figures 7 and 8, column 7 lines 29-67, and column 8, and column 9 lines 1-28.	1-16
X	US 5,867,495 A (ELLIOTT et al.) 02 February 1999, Figures 19A and 19F, column 71 lines 39-67, and columns 72-92, and column 93 lines 1-50.	1-16
Y	US 5,884,032 A (BATEMAN et al.) 16 March 1999, Figure 1, columns 2 and 3, and column 4 lines 1-22.	17-20

☒ Further documents are listed in the continuation of Box C.   ☐ See patent family annex.

	Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A"	document defining the general state of the art which is not considered to be of particular relevance		
"E"	earlier document published on or after the international filing date	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L"	document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O"	document referring to an oral disclosure, use, exhibition or other means		
"P"	document published prior to the international filing date but later than the priority date claimed	"&"	document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 JANUARY 2001	**26 FEB 2001**

Name and mailing address of the ISA/US	Authorized officer
Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231	JOHN PEZZLO
Facsimile No. (703) 305-3230	Telephone No. (703) 305-3900

Form PCT/ISA/210 (second sheet) (July 1998) ★

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,878,130 A (ANDREWS et al.) 02 March 1999, Figures 9, 10, and 11, column 11 lines 39-67, and columns 12 and 13, and column 14 lines 1-47.	17-20

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